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CENTRAL INTELLIGENCE AGENCY REPORT

INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS CD NO.

50X1-HUM

COUNTRY USSR

DATE OF INFORMATION 1949

SUBJECT Scientific - Chemistry

HOW PUBLISHED Monthly periodical

DATE DIST. 20 Feb 1950

WHERE PUBLISHED USSR

NO. OF PAGES 1

DATE PUBLISHED Nov 1949

SUPPLEMENT TO REPORT NO.

LANGUAGE Russian

SOURCE Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol XIX, No 11, 1949.

THE PHOSPHORESCENCE SPECTRA OF BENZOL AND OF ITS METHYL SUBSTITUTION PRODUCTS

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Submitted 23 June 1949

The phosphorescence spectra of alcohol solutions of benzol and its methyl substitution products, toluene, orthoxylene, paraxylene, metaxylene, and mesytilene, possess a clearly expressed oscillatory structure at temperatures of liquid air. A study of this structure permits one to find, for each of the named substances, the formation scheme of the spectra. This scheme agrees basically with the forbidden symmetrical properties that hold true for fluorescence and absorption of vapors in a given substance.

A comparison of the oscillations, which in agreement with the formation scheme appear in the spectra of individual substances, indicates that the spectra of all the above-enumerated substances can be interpreted by means of a very small set of oscillations. The most active oscillation in all the compounds studied is the partially symmetrical oscillation corresponding to variations of the type of C-C bonds (in benzol this oscillation possesses a frequency of 1596 centimeters).

In the analysis of the oscillatory structure of a spectrum and the intensity relations for individual lines, attempts were also made to develop certain conclusions concerning the symmetry of the electron envelope, or cloud, in an excited molecule and the direction of the electric moment.

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